116334

SEARCH REQUEST FORM Scientific and Technical Information Center - EIC2800

Rev. 8/27/01 This is an experimental format -- Please give suggestions or comments to Jeff Harrison, CP4-9C18, 306-5429.

Date 03/08/04 Serial # 09/813880 Priority Application Date 000603

Your Name Alexander Gilman Examiner #

AU 2833 Phone 571 272 2004 Room Jeff 10C15

In what format would you like your results? Paper is the default. (PAPER) DISK EMAIL

If submitting more than one search, please prioritize in order of need.

The EIC searcher normally will contact you before beginning a prior art search. If you would like to sit with a searcher for an interactive search, please notify one of the searchers.

03-09-04 A08:43 IN

Where have ~~you searched so far~~ on this case?
Circle: (USPT) (DWPI) EPO Abs (JPO Abs) IBM TDB
Other:

What relevant art have you found so far? Please attach pertinent citations or Information Disclosure Statements. See STIC Search Report ~~of~~ for this case

What types of references would you like? Please checkmark:

Primary Refs ___ Nonpatent Literature V Other ___
Secondary Refs ___ Foreign Patents V
Teaching Refs ___

What is the topic, such as the **novelty**, motivation, utility, or other specific facets defining the desired **focus** of this search? Please include the concepts, synonyms, keywords, acronyms, registry numbers, definitions, structures, strategies, and anything else that helps to describe the topic. Please attach a copy of the abstract and pertinent claims.

Please expand the search for the formula found earlier to include aluminum-borate phosphor with crystal structure and rhombohedral crystal.

Please see attached of the previous search report

Staff Use Only
Searcher: HERTZOG
Searcher Phone: 2-2663
Searcher Location: STIC-EIC2800, ~~CP4-9C18~~ 7F4A58
Date Searcher Picked Up: 3/4/04
Date Completed: 3/4/04
Searcher Prep/Rev Time: 30
Online Time: 120

Type of Search
Structure (#)
Bibliographic V
Litigation
Fulltext
Patent Family
Other

Vendors
STN V
Dialog
Questel/Orbit
Lexis-Nexis
WWW/Internet
Other

STIC Search Report
EIC 2800

STIC Database Tracking Number: 116334

TO: Alexander Gilman **Location:** **Art Unit : 2833** **Thursday, March 11, 2004** **Case Serial Number: 09/813880**	**From: Scott Hertzog** **Location: EIC 2800** **JEF4B68** **Phone: 272-2663** **Scott.hertzog@uspto.gov**

Search Notes

Examiner Gilman,

Attached are edited first pass search results from the patent and nonpatent databases.

Colored tags indicate abstracts especially worth your review.

If you need further searching or have questions or comments, please let me know.

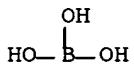
Thanks,
Scott Hertzog

```
     FILE 'REGISTRY' ENTERED AT 15:16:07 ON 11 MAR 2004
L1           28 SEA ((Y OR GD) AND AL AND B AND O AND TB AND CE)/ELS,MAC
     FILE 'HCAPLUS' ENTERED AT 15:16:16 ON 11 MAR 2004
L2            7 SEA L1
L3            0 SEA L2 AND (STRUCT? OR CRYST? OR RHOMB?)
L4            4 SEA ALUMINUM GADOLINIUM TERBIUM BORATE
L5            1 SEA ALUMINUM GADOLINIUM TERBIUM YTTRIUM BORATE
L6            4 SEA ALUMINUM TERBIUM YTTRIUM BORATE
L7            7 SEA (L4 OR L5 OR L6)
L8            7 SEA L7 NOT L1
L9            1 SEA L8 AND (STRUCT? OR CRYST? OR RHOMB?)
L10             SEL PLU=ON  L9 1- RN :       10 TERMS
L11       46130 SEA L10
L12       46130 SEA L10
L13       13029 SEA L12 AND (STRUCT? OR CRYST? OR RHOMB?)
L14       46130 SEA L10
L15        9100 SEA L14 AND (CRYST? OR RHOMB?)
L16       46130 SEA L10
L17        1698 SEA L16 (L)(CRYST? OR RHOMB?)
     FILE 'REGISTRY' ENTERED AT 15:24:52 ON 11 MAR 2004
L18           1 SEA 13813-77-9/RN
     FILE 'HCAPLUS' ENTERED AT 15:24:53 ON 11 MAR 2004
L19          82 SEA L18
     FILE 'REGISTRY' ENTERED AT 15:24:53 ON 11 MAR 2004
L20           1 SEA 260809-40-3/RN
     FILE 'HCAPLUS' ENTERED AT 15:24:53 ON 11 MAR 2004
L21           2 SEA L20
     FILE 'REGISTRY' ENTERED AT 15:24:54 ON 11 MAR 2004
L22           1 SEA 320608-87-5/RN
     FILE 'HCAPLUS' ENTERED AT 15:24:54 ON 11 MAR 2004
L23           2 SEA L22
     FILE 'REGISTRY' ENTERED AT 15:24:54 ON 11 MAR 2004
L24           1 SEA 320608-54-6/RN
     FILE 'HCAPLUS' ENTERED AT 15:24:54 ON 11 MAR 2004
L25           1 SEA L24
     FILE 'REGISTRY' ENTERED AT 15:24:55 ON 11 MAR 2004
L26           1 SEA 260809-41-4/RN
     FILE 'HCAPLUS' ENTERED AT 15:24:55 ON 11 MAR 2004
L27           2 SEA L26
     FILE 'REGISTRY' ENTERED AT 15:24:55 ON 11 MAR 2004
L28           1 SEA 13813-76-8/RN
     FILE 'HCAPLUS' ENTERED AT 15:24:56 ON 11 MAR 2004
L29         239 SEA L28
L30         295 SEA L29 OR L27 OR L25 OR L23 OR L21 OR L19
L31         142 SEA L30 (L)(CRYST? OR RHOMB?)
L32           0 SEA L30 (L)(RHOMB?)
L33           4 SEA L30 AND(RHOMB?)
L34           0 SEA ALUMINUM CERIUM TERBIUM YTTRIUM BORATE
L35           0 SEA ALUMINUM TERBIUM CERIUM YTTRIUM BORATE
L36           4 SEA ALUMINUM TERBIUM YTTRIUM BORATE
L37           4 SEA ALUMINUM GADOLINIUM TERBIUM BORATE
L38           1 SEA (L36 OR L37)(L)CERIUM
L39          30 SEA ALUMINUM(L)(CERIUM OR TERBIUM)(L)(YTTRIUM
                OR GADOLINIUM)(L)(BORATE OR BORIC OR BORON(L)OXYGEN)
L40           0 SEA L39 AND RHOMB?
L41           4 SEA L39(L)(CRYST? OR STRUCT?)
L42           4 SEA L41 NOT L33
```

```
L43           1 SEA L42 NOT PY>2000
L44          25 SEA ALUMINUM(S)(CERIUM OR TERBIUM)(S)(YTTRIUM
                OR GADOLINIUM)(S)(BORATE OR BORIC OR BORON(S)OXYGEN)
L45           4 SEA L44(S)(CRYST? OR STRUCT?)
L46          58 S ((Y OR GD) AND AL AND B AND O AND TB)/ELS,MAC
L47          27 S L46 AND 5-6/ELC

     FILE 'HCAPLUS' ENTERED AT 16:07:36 ON 11 MAR 2004
L48           8 S L47
L49           0 S L48 AND RHOMB?
L50           1 S L48 AND (CRYST? OR STRUCT?)
L51           0 S L50 NOT L45 NOT L9
```

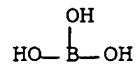
L33 ANSWER 1 OF 4 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1975:178616 HCAPLUS
TI Preparation of aluminum rare earth borate crystals and characteristics of their morphology
AU Leonyuk, N. I.; Pashkova, A. V.; Semenovat, T. D.
SO Izvestiya Akademii Nauk SSSR, Neorganicheskie Materialy (1975), 11(1),181-2
CODEN: IVNMAW; ISSN: 0002-337X
AB The crystals have the formula LnAl3(BO3)4. The basic morphology is a nonsharp **rhombohedron** in combination with a hexagonal prism. The pinacoidal form occurs rarely. Six simple forms characterizing the morphol. are discussed. The habit of the Al rare earth borates for Sm to Yb varies considerably; the Sm borates are the most elongated along the c-axis, followed by the Eu borates. The Tm and Yb borate crystals are the most isometric. The variances in the crystals are due partly to their nonuniform preparation conditions.
CC 75-4 (Crystallization and Crystal Structure)
IT **13813-77-9** 15843-75-1 17836-20-3 39282-92-3 40398-99-0
51580-71-3 51580-72-4 51580-73-5 51580-74-6 51580-75-7
55304-20-6
RL: PRP (Properties)
(crystal form of, in relation to growth)
IT **13813-77-9**
RL: PRP (Properties)
(crystal form of, in relation to growth)
RN 13813-77-9 HCAPLUS
CN Boric acid (H3BO3), aluminum gadolinium(3+) salt (4:3:1) (8CI, 9CI) (CA INDEX NAME)

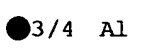


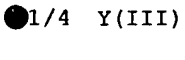
●3/4 Al

●1/4 Gd(III)

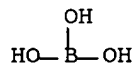
L33 ANSWER 2 OF 4 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1968:44675 HCAPLUS Full-text
TI Chromium(III) electron paramagnetic resonance in yttrium trialuminum tetraborate crystals
AU Atsarkin, V. A.; Kravchenko, V. B.; Matveeva, I. G.
CS Inst. Radiotekh. Elektron., Moscow, USSR
SO Fizika Tverdogo Tela (Sankt-Peterburg) (1967), 9(11), 3353-4
CODEN: FTVTAC; ISSN: 0367-3294
AB The E.P.R. spectrum was investigated at room temperature in the region of wavelengths 3-0.8 cm. It consists of 3 groups of lines corresponding to 3 magnetically-nonequiv. complexes of Cr3+ ions, differing only by orientation of the magnetic axes and going 1 into the other on rotation by 120° around the 3-fold axes. The spectrum of each magnetic complex has **rhombic** symmetry and can be described by a spin Hamiltonian of the type: .SCRIPTH. = gxβHx.cxa.Sx + gyβHy.cxa.Sy + gzβHz.cxa.Sz + D(.cxa.Sz2 - (5/4)) + E(.cxa.Sx2 - .cxa.Sy2). .cxa.Sx, .cxa.Sy, and .cxa.Sz are operators of the spin projections (S = 3/2) on the main magnetic axes; Hx, Hy, Hz = corresponding components of external magnetic field, H; gx = 1.975 ± 0.002; gy = 1.973 ± 0.002; gz = 1.9800 ± 0.0002 |D| = (15.52 ± 0.03) GHz. and E = (0.35± 0.02) GHz. The time of spin-lattice relaxation of Cr3+ in YAl3(BO3)4 measured by the impulse method on the transition -1/2 ↔ + 1/2 at 3 cm. wavelength and orientation of .vector.H along 3-fold axes is 1.3 sec. at 4.2°K. and 4.5 sec. at 1.8°K.
CC 73 (Spectra and Other Optical Properties)
IT **13813-76-8**
RL: PRP (Properties)
(electron spin resonance and magnetic spin-lattice relaxation of chromium(3+)-containing)
IT **13813-76-8**
RL: PRP (Properties)
(electron spin resonance and magnetic spin-lattice relaxation of chromium(3+)-containing)
RN 13813-76-8 HCAPLUS
CN Boric acid (H3BO3), aluminum yttrium(3+) salt (4:3:1) (8CI, 9CI) (CA INDEX NAME)







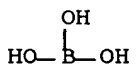
L33 ANSWER 3 OF 4 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1963:38166 HCAPLUS
TI Rare earth aluminum or chromium borates
IN Ballman, Albert A.
PA Bell Telephone Laboratories, Inc.
PI US 3057677 19621009 US 19601006
AB Rare earth borates are prepared by melting in a flux of a molybdic oxide and a K salt. Compds. prepared are YAl3B4O12 (I), GdAl3B4O12, ErAl3B4O12, SmAl3B4O12, NdAl3B4O12 DyAl3B4O12, TbAl3B4O12 (II), HoAl3B4O12, EuAl3B4O12 (III), GdCr3B4O12, and SmCr3B4O12. All of these are piezoelec. and I, II, and III show ultraviolet excited fluorescence with line widths of .apprx.0.9 A. The crystal system of these compds. is trigonal with a **rhombohedral** lattice; ns are reported.
NCL 023059000
CC 17 (Industrial Inorganic Chemicals)
IT **13813-76-8**, Aluminum yttrium borate, Al3Y(BO3)4 **13813-77-9**, Aluminum gadolinium borate, Al3Gd(BO3)4 15843-75-1, Aluminum europium borate, Al3Eu(BO3)4 51580-71-3, Aluminum samarium borate, Al3Sm(BO3)4 51580-72-4, Aluminum holmium borate, Al3Ho(BO3)4 51580-75-7, Aluminum erbium borate, Al3Er(BO3)4
(preparation and properties of)
IT **13813-76-8**, Aluminum yttrium borate, Al3Y(BO3)4 **13813-77-9**, Aluminum gadolinium borate, Al3Gd(BO3)4
(preparation and properties of)
RN 13813-76-8 HCAPLUS
CN Boric acid (H3BO3), aluminum yttrium(3+) salt (4:3:1) (8CI, 9CI) (CA INDEX NAME)



●3/4 Al

●1/4 Y(III)

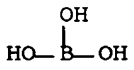
RN 13813-77-9 HCAPLUS
CN Boric acid (H3BO3), aluminum gadolinium(3+) salt (4:3:1) (8CI, 9CI) (CA INDEX NAME)



●3/4 Al

●1/4 Gd(III)

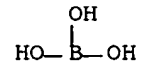
L33 ANSWER 4 OF 4 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1963:11861 HCAPLUS
TI Crystallographic data for new rare earth borate compounds
AU Mills, A. D.
CS Bell Telephone Labs., Inc., Murray Hill, NJ
SO Inorg. Chem. (1962), 1, 960-1
AB The lattice consts., ds., and unit cell vols. were determined for a new series of rare earth borates, RX3(BO3)4, where R is Y or other rare earth and X is Al or Cr. These compds. are of interest in the fundamental study of rare earth compds. and because they are piezoelec. and fluorescent. The compds. were grown from a molten-salt solvent of K2SO4 and molybdic anhydride, except for those of Yb, Ho, and Er which were grown from a Pb3(BO3)4 flux. All the x-ray patterns of the RAl3(BO3)4 and RCr3(BO3)4 indicate that the crystals are isostructural. A table is given showing the observed and calculated interplanar spacings and the observed intensities of YAl3(BO3)4. The crystallographic data for the RX3(BO3)4 compds. are given in another table. The lattice consts. and unit-cell vols. were calculated by using hexagonal indexes and then were converted to the **rhombohedral** indexes. It was shown that the cell vols. decreased slightly with increasing atomic number of the rare earth ion, following the lanthanide contraction.
CC 8 (Crystallization and Crystal Structure)
IT **13813-76-8**, Aluminum yttrium borate, Al3Y(BO3)4 **13813-77-9**, Aluminum gadolinium borate, Al3Gd(BO3)4 15843-75-1, Aluminum europium borate, Al3Eu(BO3)4 51580-71-3, Aluminum samarium borate, Al3Sm(BO3)4 51580-72-4, Aluminum holmium borate, Al3Ho(BO3)4 51580-75-7, Aluminum erbium borate, Al3Er(BO3)4 55304-20-6, Aluminum ytterbium borate, Al3Yb(BO3)4
(crystal structure of)
IT **13813-76-8**, Aluminum yttrium borate, Al3Y(BO3)4 **13813-77-9**, Aluminum gadolinium borate, Al3Gd(BO3)4
(crystal structure of)
RN 13813-76-8 HCAPLUS
CN Boric acid (H3BO3), aluminum yttrium(3+) salt (4:3:1) (8CI, 9CI) (CA INDEX NAME)



●3/4 Al

●1/4 Y(III)

RN 13813-77-9 HCAPLUS
CN Boric acid (H3BO3), aluminum gadolinium(3+) salt (4:3:1) (8CI, 9CI) (CA INDEX NAME)



●3/4 Al

●1/4 Gd(III)

L42 ANSWER 1 OF 4 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 2003:453405 HCAPLUS
TI Optical and magnetic spectroscopy of rare-earth-doped yttrium aluminium borate (YAl3(BO3)4) single crystals
AU Watterich, A.; Aleshkevych, P.; Borowiec, M. T.; Zayarnyuk, T.; Szymczak, H.; Beregi, E.; Kovacs, L.
CS Research Institute for Solid State Physics and Optics, Budapest, 1121, Hung.
SO Journal of Physics: Condensed Matter (2003), 15(19), 3323-3331
CODEN: JCOMEL; ISSN: 0953-8984
PB Institute of Physics Publishing
AB For Ce3+, Er3+ and Yb3+ ions, ESR spectra typical for S' = 1/2 ions are measured for YAl3(BO3)4 (YAB) single crystal. The spectra show axial symmetry indicating that all 3 dopants replace Y3+ at the given dopant concentration Corresponding ~g- and hyperfine ~A-tensors are determined The EPR linewidth of Ce broadens with increasing temperature due to an Orbach relaxation process. Fitting the curve with an exponential, the energy difference is equal to 270 ± 16 cm-1. The optical absorption and excitation spectra of Ce in YAB single crystal measured at 300 K are similar to those found for polycryst. materials. High-resolution polarized emission from the lowest excited to the 2F5/2 ground state, measured at 4.2 K, indicates a splitting of the ground state into 3 levels. The 2nd level is located 277 ± 18 cm-1 above the 1st 1, in excellent agreement with the EPR result, and the 3rd level is located 140 ± 10 cm-1 above the 2nd 1.
CC 73-4 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)
Section cross-reference(s): 77
IT 7440-45-1, **Cerium**, properties 7440-52-0, Erbium, properties 7440-64-4, Ytterbium, properties 14041-50-0, Ytterbium 171, properties 14041-51-1, Ytterbium 173, properties 14380-60-0, Erbium 167, properties 18472-30-5, Erbium(3+), properties 18923-26-7, **Cerium**(3+), properties 18923-27-8, Ytterbium(3+), properties
RL: MOA (Modifier or additive use); PRP (Properties); USES (Uses)
(Al3Y(BO3)4 containing; optical and magnetic spectroscopy of rare-earth-doped **yttrium aluminum borate** (YAl3(BO3)4) single **crystals**)

L42 ANSWER 3 OF 4 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 2001:163259 HCAPLUS
TI Structural and scintillation properties of new Ce3+-doped alumino-borate
AU Aloui-Lebbou, O.; Goutaudier, C.; Kubota, S.; Dujardin, C.; Cohen-Adad, M. T.; Pedrini, C.; Florian, P.; Massiot, D.
SO Optical Materials (Amsterdam, Netherlands) (2001), 16(1/2), 77-86
CODEN: OMATET; ISSN: 0925-3467
AB The compound LuAl3(BO3)4 doped with Ce3+ ions was synthesized and studied for the first time. It was compared with analogous Y and Gd alumino-borates. All materials were prepared as polycryst. powders by solid state reaction. These three compds. have a trigonal structure with a R32 space group and the symmetry of each Al, lanthanide and B site were confirmed by MAS NMR expts. Main structural, thermal and fluorescence properties are given. The results show that in these compds. there are two sites of Ce3+ and in the UV range (maximum at 340 and 365 nm) Ce3+ exhibits a 25 ns fluorescence. An extra-emission is observed in the low energy range. It could be originated from nonregular sites (Al and/or interstitial sites).
IT 13813-76-8P, **Yttrium aluminum borate**
(YAl3(BO3)4) 80885-19-4P
RL: PRP (Properties); SPN (Synthetic preparation); PREP (Preparation)
(preparation and **crystal structure** and fluorescence of **cerium**(3+)-doped derivative)
IT 13813-77-9P, **Gadolinium aluminum borate**
(GdAl3(BO3)4)
RL: PRP (Properties); RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)
(preparation, **crystal structure**, and thermal decomposition, and fluorescence of **cerium**(3+)-doped derivative)